the CORNELL-DUBILIER Capacitor

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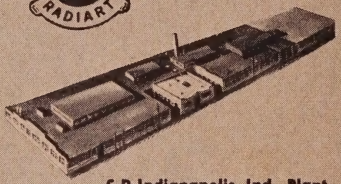

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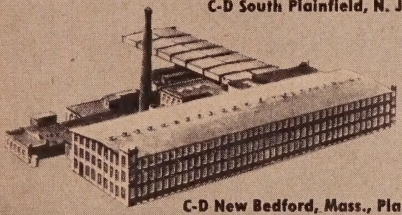

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CAPACITANCE METERS

A bridge of some type usually is employed for the accurate measurement of capacitance. It always should be used when exactness is demanded. Occasionally, a special capacitance-checking oscillator is used, and good accuracy also is obtainable with this type of instrument. It should be noted that each of these devices is a manipulatory type of instrument. That is, each must be adjusted carefully before it will yield a proper capacitance reading. A certain amount of skill is required of the operator, and often calculations must be performed after manipulating the controls and taking readings.

Manipulatory-type instruments are less desirable in rapid trouble shooting in radio and television than those giving direct readings. It may be hard for the unhurried laboratory engineer to appreciate this point. But the busy service technician, who often must daily perform hundreds of measurements as quickly as possible, understands it very well. When every minute of testing time must earn money, a speedy direct-reading instrument is to be preferred to one that requires adjustments. This accounts for the compromise acceptance of less-accurate **capacitance meters** in servicing and in some types of production testing. Professional **microfarad meters** are employed at certain points in capacitor production for quick checks.

The efficient service shop should be equipped with **both** a bridge and a capacitance meter. Recommended bridges are Cornell-Dubilier Model BF-50, which is a full-sized capacitor analyzer, and the Model BN capacitor bridge. The meter should be used for rapid testing of capacitors on a comparative or "go-no-go" basis in trouble shooting, and the bridge for final close checking of capacitance, power factor, and leakage values.

The disrepute of the capacitance meter arises from the possibility of obtaining an inaccurate reading with this instrument. The picture is complicated by the fact that inaccuracies are not always present, and when they are, cannot ordinarily be stated as any **fixed** percentage of the meter reading or of the full-scale meter deflection. It is not practical, therefore, to apply a correction factor. In **troubleshooting,** however, this inaccuracy, when present, occasionally is too low to be of consequence.

Capacitance meters are obtainable as separate instruments. Also, some servicemen's multimeters and analyzers, both of the vacuum-tube and non-electronic types, include capacitance ranges among their other functions.

The service technician or experimenter who desires can construct a simple capacitance meter from miscellaneous parts. An inexpensive instrument of this type becomes useful for rapidly identifying unmarked capacitors or those with mutilated labels or color codings, as well as checking comparative condition of recognizable capacitors.

Nature of Capacitance Meter

In order to understand the limitations of the simple capacitance meter, it is necessary to know its theory of operation. An explanation of the instrument therefore is appropriate.

We may start by stating that an ideal capacitor is a **reactance.** The larger the capacitance, the smaller the reactance, since capacitive reactance $X_c = 1/6.28fC$. A simple method of checking a capacitor therefore would be to

connect it in series with a known a. c. voltage and an a. c. ammeter or milliammeter, and to determine its reactance (and later its capacitance) by means of Ohm's Law from the applied voltage and resulting current. This is the type of measurement afforded by the simple capacitance meter.

A capacitance meter circuit may be set up as shown in Figure 1. An a. c. potential of known value (E, in volts) is applied to the input terminals. The current reading (I, in amperes) is taken from the meter. Capacitive reactance (X_c, in ohms) and capacitance (C, in microfarads) then may be calculated from Ohm's Law for A. C., thus:

(1) $X_c = E/I$

From which:

(2) $C\ (\text{ufd}) = \dfrac{10^6}{6.28 f X_c}$ (frequency is in cycles)

Capacitance also might be computed directly, without first calculating X_c, in the following manner:

(3) $C\ (\text{ufd}) = \dfrac{10^6 I}{6.28 f E}$

Several capacitance ranges may be provided by switching either the current ranges of the meter or the applied a. c. voltage, or both. A direct-reading microfarad scale may be provided for the meter on the basis of calculations (Equation 3) or by calibrating with a number of accurately-known capacitors.

In many instances, the type of measurement provided by the simple capacitance meter will be satisfactory. However, it must be borne in mind that a capacitor is not a simple reactance, but is an impedance (Z), since it contains resistive components (R) as well as capacitance. More accurately then, the current (I) in the test circuit is equal to E/Z, rather than E/X. Since the R factor is not measured readily with simple equipment and methods, it cannot ordinarily be taken into account in the "reactance-type meter" check just described.

The current meter deflection is dependent upon the power factor or Q of the capacitor under test, as well as upon capacitance. Power factor and Q both include the resistive factor. Thus, two capacitors actually having identical capacitance values might give different meter readings if their power factor values were high and differed sufficiently from each other. Most

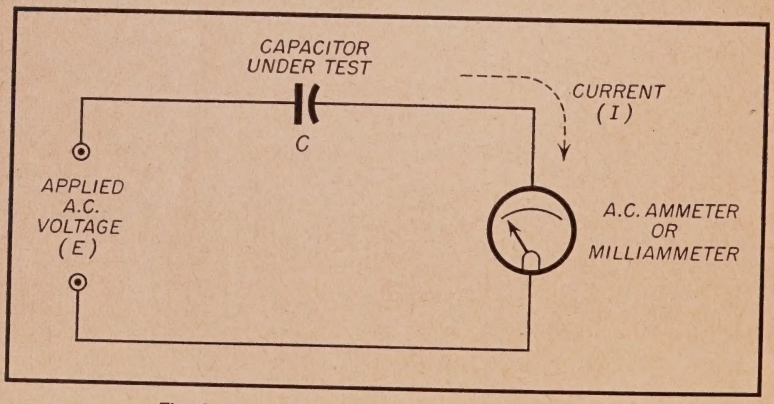

Fig. 1. Simple Reactance-Type Capacitance Meter.

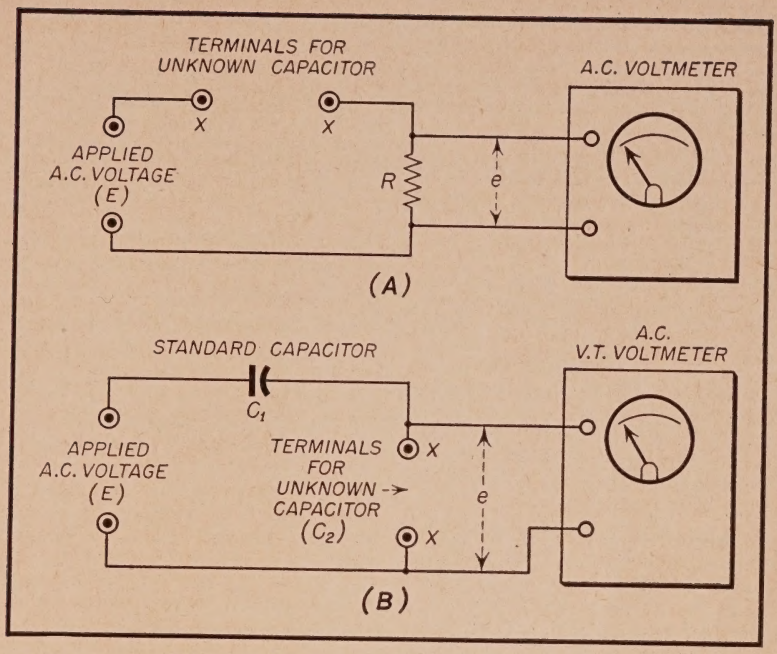

Fig. 2. Use of Voltmeter to Check Capacitance.

new, high-grade non-electrolytic capacitors have low power factor values and can be checked with fair accuracy using a simple capacitance meter. In defective units, however, the power factor may be high enough to introduce serious inaccuracy in the capacitance indications.

Before checking any capacitor with the simple reactance meter-type instrument, a preliminary test should be made of continuity, since a short-circuited capacitor might cause meter damage.

Use of Voltmeter to Check Capacitance

An a. c. voltmeter can be used to obtain a rough check of capacitance. Figure 2 shows two applications of this method.

In Figure 2(A), an a.c. voltage is applied to the unknown capacitor (connected to terminals X-X) and an accurately-known resistor, R, in series. R is kept small with respect to the reactance, X_c, of any unknown capacitor to be checked. The voltmeter resistance must be high as compared with resistance R.

Neglecting phase angle considerations, the voltage drop (e) across the resistor will be directly proportional to the unknown capacitance. That is, large values of capacitance will give high voltage deflections, and vice versa. Resistor R thus converts the voltmeter into an a. c. ammeter or milliammeter, the deflection of which is proportional to current flowing

through the unknown capacitor. The voltmeter scale may be calibrated with the aid of a number of accurately-known capacitors connected successively to terminals X-X. Various values of R or the applied a. c. voltage, or both, may be switched into the circuit to provide desired capacitance ranges, always keeping R low with respect to X_c values for a particular capacitance range.

A variation of this scheme, which requires a high-resistance a. c. vacuum tube voltmeter, is shown in Figure 2(B). In this arrangement, a constant a. c. voltage (E) is applied to a standard capacitor (C_1) of accurately-known capacitance value, in series with the unknown capacitor (C_2). Various values of standard capacitor (C_1) may be switched into the circuit to provide desired capacitance ranges.

Capacitors C_1 and C_2 form a capacitive voltage divider, and the v. t. voltmeter measures the drop (e) across C_2 alone. For any capacitance range, if C_1 is kept high with respect to C_2, the unknown capacitance C_2, will be equal approximately to:

(4) $C_2 = C_1(e/E)$

C_1 and C_2 each is expressed in microfarads or micromicrofarads.

In both of the voltmeter schemes, the applied voltage (E) and its frequency must be held to constant values. Before connecting the capacitor into the test circuit, it should be checked for continuity since a short-circuited capacitor can cause forcible deflection of the meter.

Professional Microfarad Meter

The professional microfarad meter is a dynamometer-type instrument. An example is the Weston Model 372 Microfarad Meter. For operation on 100 to 130 volts a. c., at 50 or 60 cycles, this instrument is available with capacitance ranges having full-scale deflections of 0.05, 0.1, 0.3, 0.5, 1, 2, 3, 5, and 10 microfarads.

500-cycle, 100-to-130-volt instruments provide full-scale deflections of 0.015 and 0.025 ufd. 500-cycle 200-to-250-volt instruments provide full-scale values of 0.001, 0.005, 0.0075, and 0.015 ufd.

Also available is a 1000-cycle meter, operated at 200 to 250 volts, with a full-scale deflection of 0.0005 ufd.

The rated accuracy of these instruments is 1 percent of full scale below 0.3 microfarad, and ½ of 1% for 0.3 ufd. and higher. In order to obtain the rated accuracy, the instrument must be operated at its rated frequency and within the specified voltage range. Also, the phase angle of the capacitor being tested must not be more than 3 electrical degrees. When using the 0.001-ufd. range of the 500-cycle 250-volt meter, and the 0.0005-ufd. range of the 1000-cycle instrument, a potential of 600 volts is imposed upon the capacitor under test.

The professional microfarad meter is a fairly expensive instrument and only on rare occasions might be found in service shops.

Test-Voltage Limitations

Before checking any capacitor with a capacitance meter of any type, the operator must ascertain whether the capacitor can withstand safely the a. c. voltage which will be applied to it during the test. This is especially important in checking electrolytic capacitors. The capacitor manufacturer's literature, and the operating instructions of a factory-built capacitance meter, should be consulted thoroughly in this respect in order to prevent damage both to the capacitor and to the instrument.

SAFETY PRECAUTIONS IN THE USE OF SELENIUM RECTIFIERS — PART TWO

We are indebted to Mr. W. F. Bonner, Technical Director of the Selenium-Intelin Division of Federal Telephone & Radio Corporation, for the opinions and technical information contained in this article, and are grateful for his assistance in its preparation. — EDITOR.

The article entitled "Safety Precautions in the Use of Selenium Rectifiers" which appeared in the July, 1952 issue of "The Capacitor" has been the subject of serious thought by manufacturers of selenium rectifiers. Reports made available to us by individuals and a report of an industry meeting dispute the validity of some of the statements made and in fairness to a growing industry, some of this later information is presented here.

A strong objection has been made by these manufacturers to the statement that "every rectifier may be expected to burn out ultimately." As a matter of fact, they contend that it is unusual for a rectifier to fail due to burn-out. The average life expectancy of a selenium rectifier is many times greater than the life of the vacuum rectifier otherwise used in radio and television sets. However, as with any electrical component, the end-of-life will eventually be reached and almost always this happens when the forward resistance of the rectifier increases to the point where the B-plus voltage has fallen below the value needed to operate the set and at this point the rectifier will be replaced.

The July article mentioned several precautions which should be taken when selenium rectifiers are used and these precautions, it is pointed out by the selenium rectifier manufacturers, have always been incorporated by the manufacturers of radio and television sets who have to date used selenium rectifiers in approximately twenty-five million radio and television sets made during the last six years.

Exception is also taken to the inference that highly toxic conditions develop when a selenium rectifier burns out. The manufacturers of these devices, through the medium of the National Electrical Manufacturers Association (a copy of Engineering Bulletin No. 48 is on file with this magazine) report that during all this period there have been no cases of poisoning brought to their attention either by the users of rectifiers, servicemen, or among the several thousand workers engaged in the manufacture of rectifiers. Furthermore, due to the overload testing of rectifiers which is carried out to insure satisfactory operation in service, toxic conditions would be much more severe in plants where selenium rectifiers are made and, if present to an alarming degree, the dangers of toxicity would have had major attention long before the industry reached its present size. Yet, this condition has not presented a problem in the plants.

Elemental selenium is not considered to be poisonous, although some of its compounds are. As with a great many materials under combustion, it might be that the burning of selenium (as sometimes happens during rectifier failure) can produce some toxic compounds. Experience, as shown above, indicates that, if present, they are in such minute quantities as not to cause any harmful effects from the fumes or from handling. In the rare cases where a rectifier does burn out, any minute quantities of selenium dioxide, which might be produced, would condense to a solid state at a temperature of 595F. or below and quickly deposit on the cooler parts of the rectifier or nearby components in the set. The odor is strong, and it would be a natural impulse to open a window to ventilate the room, but there has been no evidence of danger even if the windows were not opened. If burn-out occurs, the protective device will open, rapid cooling will occur, and no further fumes or odor will be given off.

In conclusion, as previously stated, no accounts in the literature have been found that report on poisoning due to selenium rectifiers. One article describes a limited exposure by a number of persons in an industrial plant to selenium fumes in vastly greater concentration than it is possible to get from a burned-out rectifier. In the summary of the report, it was stated that it appears that limited exposure to selenium fumes does not produce selenium poisoning.

Selenium rectifiers have made a definite contribution in the fields of communication and power conversion. The savings in copper and iron made possible by the use of this new circuit component in radio and television sets, as well as in electrical equipment generally, have been an important factor in stretching the stock-pile of these strategic materials.

We hope that this brief summary of industry's long experience with selenium rectifiers will serve to reassure the serviceman and, through him, the set owner, that radio and television sets equipped with selenium rectifiers incorporate all of the advantages of performance and economy of this type of rectifier, and that no hazard exists in their use.

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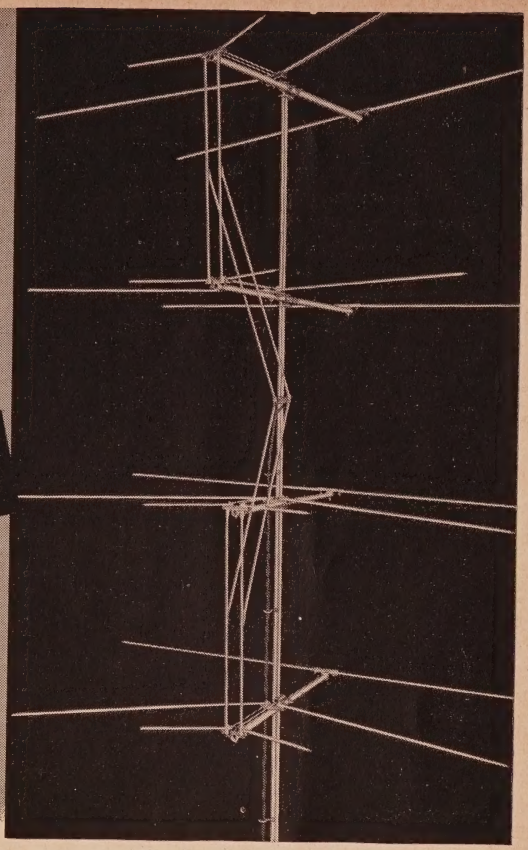

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FOR SALE—Hickok TV gen. 610A; HQ 129X with spkr.; Little Slugger described in July '49 CQ; 5" Dumont scope, like new; antenna rotator, APQ9, ASB 7, aircraft rec. AVR7HLN, like new; Dick recorder, and many others. John B. Gardner, 2229 Creston Ave., Bronx 53, N. Y.

FOR SALE—AVR-15 $15; BC-221 with AC supply $50; Super Pro BC794 160-10 meters in cabinet with spkr and supply $140. E. Schultz, 46 Acacia Ave., Hempstead, N. Y.

TRADE OR SELL—Magazines: Radio Television News, Radio Craft, Radio Electronics, Radio Service, Radio Service Dealer, Radio Maintenance. G. H. Swiska, 109 E. School St., Woonsocket, R. I.

TRADE OR SELL—Several electrical, radio and TV books, all like new. Send for list. Includes TV Simplified, Radioman's Handbook, FM Transmission & Reception, Mathematics for Electricians & Radiomen, etc. Preston L. Williams, 415 Liberty St., So. Norfolk 6, Va.

FOR SALE—HRO-5TAL rec. comp. with spkr. and coils $100; 832A $4; 2E26 $1.50; VFX680 $35; 1 KW RCA modulation transformer $25; high voltage transformers and condensers. All offers considered. H. L. Spence, Box 797, Smyrna, Ga.

SELL OR TRADE—Air compressor 1/5 hp. motor and tank $30; 6-tube hi-fi amp. 12" dynamic spkr—Astatic mike $25; 6-tube Philco auto radio; 5 cases chemicals and lab eqpt. Sivvy Vecchione, 9140 87 St., Woodhaven 21, N. Y.

SALE OR TRADE—Std. organ keyboard and pedalboard suitable for electronic organ, 6 contacts per note $20 ea., plus shipping charges. Want hi-fi 12" spkr. Paul B. Taylor, 12 W. Dayton Dr., Fairborn, O.

FOR SALE—National mod. NC-57B comm. rec. in exc. cond. $50 FOB. Want 12½" or 14" TV kit for Magnavox Traditional comb. radio mod. 279P, first class cond. Will pay cash. Harry M. Denison, 21 S. 4th St., Columbia, Pa.

SALE OR SWAP—DeForest's Radio and TV Course for Signal Tracer, sig. gen. or what have you. Also 8mm Univex movie projector mod. PU-8 for 10"-12" TV or test eqpt. Allan A. Simpson, Box 266, Hope Valley, R. I.

SELL OR TRADE—Photographic eqpt. including enlargers, contact printers, lens, etc. Want 20 or 40 meter ham gear, rec., outboard motor. Send for list. J. R. Floyd, 4300 Rusk, Houston 23, Tex.

SALE OR TRADE—R. F. French meter 0-0.8; comp. parts to build Midget Shortwaver 1400 kc. to 32 mc. Will supply Radio Electronics Magazine, Sept. 1951, how to build set, $10 or trade for tubes. Frank Bou, 1639 N. Broad St., Philadelphia 22, Pa.

FOR SALE—Jensen A-12 hi-fi electro-dynamic spkr., 8-ohm 15 w. voice coil, 2500 ohm field, exc. cond. $7.50 postpaid. David Hodges, 7 Sycamore St., Bronxville, N. Y.

FOR SALE—Howard Sams Folders 1-90 in orig. env., 95% never used. Also Riders 1-5 abr., 6-14; all for $75, express collect. Ralph B. Gough, 900 Asylum Ave., Hartford 5, Conn.

WANTED—Millen or Eldico grad dip osc., not junk. Will swap Weston master exposure meter or 1000 v. pwr. supply parts 12 vdc hvy. duty gen., new. P. Smith, 2515 McKinley Ave., El Paso, Tex.

WANTED—General Radio Instruments, 583-A, 722-D, 650-A, 650-P1, 1021-A, 1302-A, 1800-A, 546-C, 720-A, 758-A, 1140-A, or equiv. discontinued types. Must be good cond. and priced right or will swap. Harry J. Harris, 1210 Home Ave., Ft. Wayne, Ind.

FOR SALE—Account of health. Completely equipped TV and radio repair business for sale, including inventory, benches, test eqpt., etc. Write F & K Radio-TV Labs, 118 E. Maple St., York, Pa.

FOR SALE—Ready to use Heath TV align.-marker gen., like new, $34. H. Woodward, Jr., 5779 Nassau Rd., Philadelphia, 31, Pa.

WANTED—Top prices paid. Navy selsyns 1DG, 1F, 1CT, 5CT, 5D, 5DG, 5G, 6G, 7G, and BC-348, BC-221, AN/ART-13, AN/ARC-1, AN/ARC-3, RTA-1B. B. Bernbaum, Lectronic Research Laboratories, 719 Arch St., Philadelphia, Pa.

SWAP—Pentron wire recorder with built-in radio; piano accordion; Harvard classics; 40-100x telescope; EC-1A rec.. Want good binoculars, comm. rec., good camera, or what have you. K. G. Davis, R. F. D. 4, Annapolis, Md.

TRADE OR SELL—Hickok 305A oscilloscope; Precision 912P tube checker; Webster 80 wire recorder; 120 folding camera, 4.5 lens plus flash; RCA Aeropressure and Turner 22X. Denar, 24 Cleveland Ave., Waldwick, N. J.

WANTED—Precision EV-20 voltmeter and Precision 1D-15 tube tester. Have Webster Chicago jack 357-1 and 2 630 RCA chassis. Marion Electronics, Marion, O.

WANTED—APR-4, other APR-,APS-; ARC-1, ARC-3, ART-13, BC-348, BC-221; TS-12, 13, 35, 45, 120, 146, 155, 173, 174, 175, 323; G-R, Ferris, L&N units, etc.;723A/B, 3C22, other tubes. Littell, Farhills Box 26D, Dayton 9, Ohio.

FOR SALE—Back numbers to about 1918: Radio News, Popular Radio, Wireless Age, Q. S. T., Electrical Experimenter, Sc. and Invention, Every Day Engineering, Radio World and others. Old radio catalogs and booklets. Raymond Conover, Stone Ridge, N. Y.

WANTED—For Boy Scout training program. 6 rec's. like ARC5's for 80 m.; all-band rec., reasonable; 2 transmitters, comp., operating, on 10 m. fixed and mobile; 3 transmitters, novice. Saul and Robert Schacket, Box 131, Jamaica, L. I., N. Y.

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FOR SALE—Hallicrafters 7" TV set model T54, exc. cond., expanded screen with Philco picture tube, like new $30. Theodore R. Albin, 3546 Princeton Dr. So., Wantagh, L. I., N. Y.

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WANTED—Cabinets for Teletone mod. 185 and RCA mod. BX-57. State cond. and price. Warren's Radio Service, 94 Milton Ave., Dorchester, Mass.

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FOR SALE—NC-183 with spkr., NBFM adaptor, tilt base—perf., $205; Millen exciter with hvy. duty pwr. supply, coils, like new $75; Heath TC-1 tube tester $25. Buyer pays postage. Need Sam's Photofacts. Stanley Wood, S. Berwick, Me.

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TRADE—8" Atlas tilt arbor bench saw, less motor, plus cash for 2-3 speed disk recorder, radio, phono comb., port. Jon S. How, 2600 Alameda St., "L-15," Vallejo, Calif.

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SWAP—2 Bud Giant tuning condensers 75 mmf. ea., 13 plates, 3/8" air gap. Want good 10 and 2 meter converter or rec. for same band — or what have you? George Cohen, 1124 Harvard Blvd., Dayton, Ohio.

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FOR SALE—Back issues of Radio Television News and Radio-Electronics, 20c a copy. E. Laudadio, 6621 Duryea Ct., Brooklyn 19, N. Y.

SALE OR TRADE—Jackson mod. 641 sig. gen.; Jackson VTVM mod. 645. Want handguns or good grade pump or auto. shotgun. Jim Sylvester, 3370 "C" St., Niagara Falls, N. Y.

WANTED—Superior super meter 670-A, 220 VDC power supply, lip, throat mikes, AN/APR-1 or AN/APR-4, 110 v. DC power supply or inverter. For sale, SCR-522, 200 used radio tubes, first amateur radio in state that used tubes. John Gilbert, 1022 Third St., Brookings, S. D.

SWAP—1950 Motorola car radio, can be mounted under dashboard of any car. Good cond. Swap for tube tester in working order, late model, or sell for $30. B. J. Sclafani, 42-14 64th St., Woodside, N. Y.

FOR SALE—Brush magnetic tape recorder and BC-412-B oscilloscope in exc. cond. Best offer. Nolan I. Wolk, 1411 Ave. N, Brooklyn 30, N. Y.

FOR SALE—Comp. 10-20 meter fone/CW transmitter, with spare tubes. No shipping, $295. J. Beamguard, 284 S. Mass. Ave., Atlantic City, N. J.

FOR SALE—Used TV sets in perf. cond. 7" $35; 10" $50; 12½" $65, cash with order only, exp. charges collect. Jones Radio Co., Box 93, Douglassville, Pa.

SWAP—National NC33 rec. and .25 cal. European automatic, both in good cond.; also Hallicrafter 7" TV and RCA record changer. Want good sig. gen. and 5" oscilloscope. Theodore Thalis, Apt. 302, 25 Kennedy St. NW, Washington 11, D.C.

FOR SALE OR TRADE—Dual speed disc recorder with Masco 17 w. amp. in carrying case; worth $60. Make cash offer or ? George Silver, 1203 Findlay Ave., New York 56, N. Y.

SWAP—ASB-3 (Cay-52 AAR) radar xmitter, w/tubes, 115 v. 800 cyc., like new. Want good sig. gen., scope or National 1-10 rec. with p. s. and coils, or what have you. Donald Kucera, 100 Taylor St., Ironwood, Mich.

SALE OR TRADE—Airline port. mod. GCB-1064, Eicor no. 15 tape recorder, mod. 601 Motorola radio, Capehart Magnetic record changer, like new, mod. 524 Set. Carlson Rec., GE-5DY82AB1 dynamotor, 5" CR scope tube. Chuck's Radio & TV Service, 13th & Stuart, Clarinda, Iowa.

WANTED—TV field strength meter for all channels; also used TV chassis. Ben's Radio Serv., No. Tonawanda 2, N. Y.

SELL OR TRADE—Philco auto. time clock in walnut case; Zenith record changer. Want RCA voltohmyst. George De Grave, 3808 Belle Plaine Ave., Chicago 18, Ill.

FOR SALE—Radio shop instruments, tools, Riders 1-14, over 1,000 diagrams, wire, clocks, 125 TV tubes, and other items. S & R Radio, 1533 S. 53, Philadelphia 43, Pa.

WANTED—16PT4 or 17BP4 TV picture tubes in good cond.; good sig. tracer, sweep gen. Have cash and many items to trade. John Arnold, P.O. B. 84, Bluffs, Ill.

WANTED—VTVM, scope, dual-heat soldering iron and other eqpt. useful to student just beginning. Prefer Eico or Heathkit. Theodore C. Wilson, 1013 15th St. N.W., Washington 5, D. C.

SALE OR TRADE—Jackson mod. 523 3" oscillograph, 3 or 4 yrs. old. Want small 10" TV or $35. Howard Haftel, 1651 Montgomery Ave., Bronx 53, N. Y.

WANTED—50 w. output transformer for push-pull parallel 6L6; Riders 9-11, 16-22; Webster wire recorder; scope; 3-speed record changer. Cardona Radio Shop, Puerto Nuevo, Puerto Rico.

SWAP—Transmitting components for .38 Colt auto. or Rem. 16 ga. 3-shot auto and 250-3,000 Savage. M. Lawson, 4010 River Dr., Houston 17, Tex.

SALE—AM-FM sig. gen., McMurdo Silver 906, perf. cond. First $65 M.O. takes it. S. Consalvo, 2507 Southern Ave. SE, Washington 20, D. C.

FOR SALE—Ford 8 tube Custom auto radio comp. with accessories, like new, $75. R. G. Streeter, 15 Hillside Ave., Summit, N. J.

SELL OR SWAP—10 sta. a.c. intercom, good shape, comp. except for extra spkrs., $25 or swap for good Simpson 260 or Triplett 630 V.O.Ma. meter, or tubes. C. Elgasser, Jr., 1920 Fern St., San Diego 2, Calif.

FOR SALE—Supreme audolyzer in good shape. Best offer takes it. University Radio & TV, 7037 W. McNichols, Detroit 21, Mich.

FOR SALE—Sams Photofacts 1-4 @ $14.50; A-1 cond. or your money back. Carrs Television Center, 15-17 Kelley Square, Worcester 4, Mass.

FOR SALE—Jensen A-12 hi-fi electro-dynamic spkr., 8-ohm 15 w. voice coil, 2500-ohm field; exc. cond., $5 exp. collect. David Hodges, 7 Sycamore St., Bronxville, N. Y.

WANTED—WE transformers 247J, 132C, 166-B; also UTC HQA-11, HQA-11, HQA-12, HQA-14, A-11 or Langevin 401B. Morgan Kennedy, 16 Monroe St., New York 2, N. Y.

WANTED—Scope, Heathkit or Eico, must be in good operation and reasonable. Prefer local seller. Barney Miller, 1107 Lenox Rd., Brooklyn 12, N. Y.

WANTED—Riders vol. 16 on up; Eico or Heathkit in good cond. Local seller preferred. Irv's Elec. Shop., Ingalls, Kan.

SWAP—1941 Plymouth radio, heater; 30 ft. "Easy Up" tower, both in fair cond., for test eqpt. or what have you? E. Ippolito, 640 Essex St., Brooklyn 8, N. Y.

SELL OR TRADE—1937 Willys for ham gear. J. L. Neely, 301 W. 6th St., Bonham, Tex.

FOR SALE—Supreme 504-B tube and set tester in exc. cond. $50 and a Robson-Burgess VOM mod. 101, good cond., $10. Manuel J. Smith, 1205 Lamanche St., N. O. 17, La.

FOR SALE—Link Radio Corp. freq. meter-monitor type 230-D2, 42.140 and 42.300 mc. comp., exc. cond. $12.50; surplus Army Ordnance 6G selsyns, $15 pr. all FOB. R. C. McClure, 106 Wadsworth Rd., North Syracuse, N. Y.

TRADE — Genuine Seitz friction jewels, setter with reamers, pushers, and anvils; balance plate and cap. cork and stamped on bottles, like new, cost $90. Want 5" or 7" scope. Ed. Hagmaier, Box 211, Clymer, Pa.

SELL OR TRADE—New and out of print books on Electronics and allied subjects. Trade for firearms, binoculars, war relics, etc. Franklin M. Roshon, 388 First Ave., Phoenixville, Pa.

SELL OR TRADE—Howard 435 AC 6-tube comm. rec., 4 bands in good cond. Table model. Want test eqpt. Joseph Jemata, 2510 21st, Astoria, L. I. C. 2, N. Y.

FOR SALE—Electronic radio resident course in good cond., 10 comp. books; fine for home study $40. Travis Heard, 10260 Oakland, Detroit 11, Mich.

WANTED—TV field strength meter. Have Supreme '49 and '50 TV manuals, like new, and/or radio parts to swap, or cash. State particulars in first letter. Sahr Radio, Fairmont, Minn.,

SWAP—DeForest's Radio & TV course. cost $275, exc. cond. Want 5" oscilloscope in good cond. Henry Nied, 3109 Milwaukee Ave., Chicago 18, Ill.

FOR SALE—Speed-O-Print mod. L rotary stencil duplicator, post card to legal size; like new $32.50 FOB. I. Allen Hanover, 47 Bay 26th St., Brooklyn 14, N. Y.

FOR SALE—Raytheon 12LP4, used only few hrs. on TV rec. conv. to 16" size; make offer. Rocco Champi, 6W Washington Ave., Atlantic Highlands, N. J.

FOR SALE—Triplett 3" sq. VOM factory rebuilt; 2 Hickok 3 3/8" sq. differential miliamp. 100-0-100; Weidenhoff 4¼" rd. 0 to 25 v. DC; Weidenhoff 600-0-600, 300-0-300 amps. 4¼" rd.; West. 3½" rd. 0-150 amps. AC. Ted Solarz, 3033 S. Pulaski Rd., Chicago 23, Ill.

SALE OR SWAP—15 years' accumulation of record changers, meters, sig. tracer, mike, spkrs., xtal phones, dials, transformers, and many other good items; send for list. Want cash, HRO rec., antique tubes. S. Wickstorm, 4908 N. Ashland, Chicago 40, Ill.

POSITION WANTED—New York City, age 27, married, WW II vet, desires practical exp., willing to learn radio and TV part time basis or full day Saturday. 1½ yrs. schooling NRI. Hyman Bloom, 131-45 225th St., Laurelton 13, L. I., N. Y.

FOR SALE—Radio serv. eqpt., manuals, tubes and misc. parts as unit only for cash. Death of operator reason for selling. Mrs. R. D. Southworth, 400 Potter Ave., Lansing 17, Mich.

CLOSEOUT SALE—500 tubes, Sam's and Riders 6, 10, 16; condensers, resistors, tools; used radios, cabinets, chassis; Radio, TV, electrical books; test eqpt., and many other items. Write for list. Frank Kesh, North Rose, N. Y.

FOR SALE—Heath mod. 0-6 oscilloscope in perf. cond. Will ship exp. coll. for $35. David Dillon, 1253 Fennimore St., Fairmont, W. Va.

FOR SALE—SX71 and spkr. like new $150; BC 455 $8; 2E24 $2.50 ea.; HS 23 like new $2.50; DM 32A-$1.50; DM 21M $3; Triplett VOM 2900 $20; VR 6113 $10; N.R.I. course books $10; Q.S.T. 37 to 49 $3 per yr. M. J. Marshall, 455 Washington Ave., Dumont, N. J.

FOR SALE—Back numbers Radio-News, Service, Radio-Electronic and other publications. Send stamp for list. B. Blatt, 8 First St., Haverstraw, N. Y.

WANTED—ART-13, ATC, TCS, SCR-694, and cables, controls, pwr. sup.; RA-62, RA-34, DY-12, PE-237, PE-103, PE-104, BC-1306, BC-610-E, BC-348, BC-342, BC-312, BC-221, LM, BC-639, panadaptors, tech. man., test eqpt. T. Clark Howard, 46 Mt. Vernon St., Boston 8, Mass.

SELL OR SWAP—Riders 7-14; will include Record Changer man. Make offer. Will swap for tape recorder or what have you? No books. Steve J. Zvara, 6515 S. Danby Ave., Whittier, Calif.

SALE OR TRADE—28-X Hickok sig. gen.; 203 Hickok V.O.M.A. meter; Precision sig. tracer mod. 200. Interested in 85 hp Continental airplane or 10 hp Mercury motors, or what have you. Earnest Couch, Jr., 1805 College St., Decatur, Ala.

SWAP—Custom built 150 w. C.W. trans., E.C.O. controlled, Vibroplex key, 3 spare 6146 tubes, ham gear, NRI comm. course. Want top 35 mm enlarger, 4x5 view camera, photo eqpt. P. Hnatt, Bullis Rd., Box 5, Marilla, N. Y.

WANTED—Mod. 488 Simpson TV field strength meter. State price and cond. State your wants; I may have a trade. Ewald Beeskau, 1234 N. 122nd St., Wauwatosa 13, Wis.

FOR SALE—Rider Chanalyst, leads, top shape $45; BC221-M freq. meter, alum. case, spares, perf. $85; Riders 1-16, index and auto. rec. changers, perf., first $85. All FOB. D. T. Sweeny, Rt. 2, Box 343G, Orlando, Fla.

FOR SALE—Motorola 7" TV in exc. cond., $20 FOB; Superior CA-11 sig. tracer used one hr., needs batteries $9. Want record changers and pocket radios or small parts. Ivan King, East Canaan, Ct.

FOR SALE—Supreme 546A 3" laboratory type oscilloscope suitable for TV, inc. marker screen and oper. man.; used 5 mos.;orig. price $110, first $50 takes it. B. S. Swink, 336 W. 11th St., N. Y., N. Y.

FOR SALE—Used Buick '42 radio $25; J. Avruch, 39-75 45th St., Long Island City 4, N. Y.

FOR SALE—Radio and TV test eqpt. from $10 to $40; also Radio & TV Course, National Schools lesson $20; Rider Amp. no. 1 book $13. A. Palermi, 223 S. Winebiddle Ave., Pittsburgh 24, Pa.

FOR SALE—Snaider proj. set (Portojector) with master unit and 52"x70" beaded screen comp.; capable of 9'x12' picture, used about 12 hrs. No reas. offer refused. W. Presky, 2177 Albemarle Rd., Brooklyn 26, N. Y.

WANTED—New 10" TV sets for disabled persons, war veterans, etc. State brand, model, and price. C. L. Somers, P.O.B. 154, Dresden, Tenn.

SALE OR TRADE—Hickok 195 5" scope; Hickok 277x sig. gen.; Preceptor "B" tube tester (cost $74.50), like new; $79.50 Cort man's wrist watch, like new. E. G. Bartlett, Atlanta, Mo.

FOR SALE—Corona port. typewriter with message type face, like new $40; Wireway port. wire recorder and phono $35 FOB. M. V. Cochran, 320 Juanita Ave., Millbrae, Calif.

FOR SALE—Globe Trotter, 35W, CW and fone; S38 rec.; BC459A; CW3, no coils; 7JP4; scope, transf.; Servicing by Signal Tracing, Q&A, Radio Operating. B. Hohweiler, 377 Dodd St., East Orange, N. J.

FOR SALE—Radio, Television, Electrical Appliance repair shop, reasonable. Good income needs at least 2 men to operate. Manny's Radio & TV Service, 140 Division Ave., Brooklyn, N. Y.

FOR SALE—Riders 2-4, like new $36. S. Lieber, 200-19 46 Ave., Bayside, N. Y.

SWAP—21 jewel Bulova man's watch and band of white gold. Exc. cond.; value $90; also Sportsman II reflex 620 camera with case. Want test eqpt. or TV set. Sgt. K. Brown AF 37585767, A/C Test. Det. No. 4, Chanute A. F. Base, Rantoul, Ill.

SELL OR TRADE—R45-ARR7 Hallicrafters rec., .55 to 42 mc. with pwr. supply; 522 rec. with 110 AC supply; Shure "Stratoliner" mike, like new; others in good op. cond. Highest offer, cash or trade. Emil Kalar, S. International Falls, Minn.

WANTED—6 v. transmitter and rec. radiophone for ship to shore and Coast Guard freq. Ted Nevola, 146-43 182 St., Jamaica 5, N. Y.

SELL OR TRADE—Zenith radio console, 4 bands, 10 tubes, rebuilt, working OK $30; FM pilot tuner, perf. cond. $20. Want Pickering LP phono head, 8mm films. What have you? G. Puente, 253-23 85th Rd., Bellerose, N. Y., N. Y.

WANTED—One good 906 (3AP1 or 3AP1A) 3" cathode ray tube at bargain price. Will trade Supreme 546 scope and cash for late good make 5" scope. McKinley's Radio Service, Zebulon, Ga.

FOR SALE—Sprague Tel-Ohmike mod. TO-3., exc. cond. $45. Victor Sperzagni, 258½ 22 St., Brooklyn 15, N. Y.

TRADE—RCP mod. 807 port. tube and set tester and Jackson mod. 640 test oscillator. Want ham transmitter, rec. or what have you? James E. Loff, 7103 3rd Ave., Apt. 3-C, Brooklyn 9, N. Y.

FOR SALE—HT 18 VFO like new $75; McMurdo 701 xmtr. 80 to 6, comp., good for mobile oper., $35; McMurdo 700 xmtr. 2 and 1¼ meters, tubes, book crystal $30. Want Elmac, Gonset transmitter, Rothman VFO. H. I. Griffiths, 3982 65th Pl., Woodside 77, L. I., N. Y.

FOR SALE—Thordarson filament transf. T-21F19, 11 v. C. tap at 11 amps. or 10 v. C. T. at 12 amps., $3. L. Matushefske, 2 Elmont Rd., Elmont, L. I., N. Y.

WANTED—Riders 15-22 inc., separately or in group; also mod. 10B Ferris sig. gen.; Weston mod. 772 analyzer; 10" RCA TV or set using 630 circuit. Edward Reim, 44 Chestnut St., Brattleboro, Vt.

FOR SALE—Precision 510 tube tester $15; Wollensak 15-40 power telescope, like new $20. Want test meter, over-under .22/.410 rifle or other shotgun. Jack L. Miller, Mich. Rd., Lakeville, Ind.

WANTED—Comb. floor mod. radio, '46-'47 with short wave preferred; also Hallicrafter SX-28 Skyrider. George M. Warren, C.A.A., Kenai, Alaska.

TRADE—National Schools Radio Course for port. TV set in good cond. Prefer nearby trade. Capt. Robert Hammack, RD 1, Aberdeen, Md.

FOR SALE—Hallicrafter S-20R for VTVM or console comb., lowest price. E. A. Bazzurro, 2625 Third Ave., N. Y., N. Y.

FOR SALE—E.M.C. mod. 203 tube, capacity tester, E.M.C. mod. 102 pocket VOM, 40 tubulars, 12 electrolytics, 10 micas, 100 ½ w. resistors, 100 ft. dial cable, 4 drawer small parts cabinet. What am I offered? All FOB. Luciano's Radio-TV Service, 516 S. First St., Fulton, N. Y.

FOR SALE—Hickok oscilloscope like new, mod. 195B. Cost $169.50, will sell for $90. Edwin A. Gruneich, Buffalo, N. Dak.

FOR SALE—Sam's Photofacts folders 1-136, A-1 cond. $125. D. E. Baisley, Jr., 81 Maple Ave., Northport, L. I., N. Y.

WANTED—BC221 freq. meter in exc. cond. with orig. calibr. chart., must be battery operated. Will pay $40 plus postage. Royce I. Heintz, 3500 Woodmoor Rd., Baltimore 7, Md.

SWAP—1951 Chev. auto radio, like new, L. C. Smith typewriter, desk model, exc. cond. and many other articles. Want a good press-type camera or anything I can use. Michael Gianfrocco, 1 Bell St., Providence 9, R. I.

FOR SALE—8" bench saw, nearly new, with table, miter gauge, rip fence, blade and V-belt for $20 or recorder. R. H. Gauger, 26-29 212th St., Bayside 60, N. Y.

WANTED—Will pay $25 for 1G, 1F, 1CT, 1DG selsyns in good cond. Also need 5G, 5F, 5CT, 5DG, 6G, 7G, etc. Navy selsyns. Albert L. Berg, 110 Pearl St., Boston 10, Mass.

FOR SALE—Harvey Wells xmtr (TBS 50C), pwr. supply, crystals and spare tubes, $100; National NC 200 rec., good cond., spare tubes, $60; pwr. supply, 500 w. w/ rack and tubes, $40; Hickok tube checker like new, mod. 533P w/man. $125. Frank J. Eckert, 36 Allston St., Revere 51, Mass.

FOR SALE—2 522 rcvrs and xmtrs comp. with tubes, racks and cases, exc. cond., $70; ARC4 VHF with tubes $25; PE 103 $20. V. Vine, 31 S. Main St., Canandiagua, N. Y.

FOR SALE—Heathkit G-1 sig. gen., fact. adj. $20; Mod. BR-44 AC capacity-resistance bridge analyser and sig. tracing amplifier $20. Edward Dobson, 32 Oliver St., Central Park, Penns Grove, N. J.

EMPLOYMENT WANTED—Pref. Southwest. A-1 TV serviceman, also 10 yrs. experience broadcast engineer. First class FCC license. Ray Brooks, RR2, Twin Lake, Mich.

FOR SALE—IRC volume control kit with 9 controls, 5 switches, 5 Q-type shafts, $6 plus postage. Bob Bair, R. 1, Box 1089, Hood River, Ore.

SALE OR TRADE—Heathkit TV alignment gen., oper. cond. $20; West. TV tuner for 40 mc. $7.50. J. T. Jans, R.D. 1, Seneca Falls, N. Y.

FOR SALE—Appr. Electronic A-200 FM TV sweep gen., fact. wired, like new; Trans. field strength meter; cost $143, first $70 takes both. Ace TV, 186 School Street, Brockton, Mass.

FOR SALE—Heathkit sig. tracer mod. T-2 condenser checker mod. C-2, $20 ea. plus postage; Chicago Ind. Equipment mod. 432 VOM $5; Weston mod. 571 output meter, good cond. $15; cash terms only. George M. Javor, 2039 E. 31 St., Lorain, Ohio.

FOR SALE—Comp. mobile P.A. system, 35 w. amp. with phono top, 2 University reentrant spkrs, RCA driver units, Electro-Voice mike, 6 v. DC or 117 v. AC oper. $110. Vallejo Radio, 58 Rodgers, Vallejo, Calif.

WANTED—Gonset tri-band converter, com. rec. (prefer Hallicrafter). State mod. and cond. of sets. Will trade radio, TV or ham eqpt. or pay cash. Chas. H. Russell, Fayetteville, Ala.

SALE OR TRADE—Full set of Sam's Photofacts, from first to last printed. Make offer or what have you to trade? Chas. Rader, 1145 Warren Ave., Vallejo, Calif.

FOR SALE—Seven coin oper. radios, all in perf. cond. State best offer FOB your town. Allen Floersheim, Roy, N. M.

WANTED—Auto radios, regardless of quantity, must be new. Please give make and model and quote lowest price. Cherry Radio Co., 1438 Belfield Ave., Philadelphia 40, Pa.

FOR SALE—$3\frac{1}{4}$x$4\frac{1}{4}$ Graflex camera, revolving back, septum for 12 pictures cut film holders (2) and film pack adapter; lens f4.5 Wollensak 7½". Herbert Paskin, 1402 Brooklyn Ave., Brooklyn, N. Y.

FOR SALE—Jeffries crystal pickup for electronic stethoscope, cost $35, sell for $15. Guaranteed like new. Riddell, P.O. Box 1930, Chicago 90, Ill.

FOR SALE—Sylvania tubetester mod. 139 like new $60; transformers power U.T.C. R4; Stancor P6004; vibrator transf. Stancor P-4062; Stancor output transf. A-3856, all $10. Wilbur Kespert, Box 6A, Youngsville, N. Y.

WANTED—Tape recording of Jack Owens Show released over CBS Tuesday, Aug. 26, at 4:30 P.M. Fred E. Miller, 3122 S.E. 73 Ave., Portland 6, Ore.

WANTED— Victor RE45 or R-32 power pack or similar in working cond. Very urgent. Stephen M. Skovran, 15 Queen St., Pittsburgh 12, Pa.

SALE OR TRADE—BC-645 high freq. transceiver with conversion data, like new, for Regina Floor Polisher or equiv. or best offer. Philip Cohen, 1325 E. 22 St., Brooklyn 10, N. Y.

TRADE—Silver Vomax mod. 900 in good cond. for RCA Senior Voltohmyst. Herbert Jones, 31 Second Ave., Franklinville, N. Y.

WANTED—Millen tuning condenser no. 21935. State price. Edison Leeds, 660 Riverside Dr., N. Y. 31, N. Y.

FOR SALE—Heathkit condenser checker, assembled, like new, in orig. carton. Comp. with test leads and instr. man. $17. Leon J. Kamienski, 2051 N. Kilbourn, Chicago 39, Ill.

FOR SALE—Masco MA-25 P.A. amp. 6L6--P.P. output, 12". Jensen spkr., leatherette wood case $20; N-80-S astatic mike, 15' cord and floor stand $12; De Armond FHC-B F hole type Spanish guitar pickup with mike cord and desk stand $15. Lester Biwer, 612 N. Spaulding Ave., Chicago 24, Ill.

WANTED—Crosley TV rec. mod. 9-407 or 9-407M-1. Need not be in operating cond. D. J. Hemingway, 25 Oak Knoll Rd., Natick, Mass.

FOR SALE—BC 221-AH $70; Select-O-Ject $18; Bud monitor and code practice oscillator $8; Webster-Chicago wire recorder mod. 180 $55. All above items in new cond. Want hi-fi FM-AM tuner, disc recording eqpt., 3-speed turntable. J. R. Halchak, 10 True St., Everett, Mass.

WANTED—Auto radio, spkr., and panel kit for 1950 Nash Statesman, in good working order. E. Bement, 22 Kerns Ave., Buffalo 11, N. Y.

WANTED—Rolleiflex. State lens make and f. no.; also serial number and year. Must be in good cond. Will buy any acc., case filters, etc., for cash, sub. to examination. I. Allen Hanover, 47 Bury 26th St., Brooklyn 14, N. Y.

SALE OR SWAP—Webster 18 recorder, port. case; Webster 178, exc. cond.; Mauser .31 cal. rifle, fair cond.; McMurdo Silver Micro Match. D. Argentini, 9 Upland Pk., Somerville, Mass.

SELL OR TRADE—7½", 10" and 12" TV trade-in sets; ladies' and men's watches. Trade for Heathkit 0-6 scope Heath tube tester and sweep gen. Wm. L. Powers, Rockport, Ind.

TRADE—Recording level indicator, mod. 83 with cont. box, for use with Webster wire rec. Want table or jig saw or ? Selcraft, Box 394, Spring Valley, N. Y.

SOUND SERVICE—We service and sell all makes, models of sound eqpt. and audio components—recorders, amplifiers, tuners,, changers, spkrs. Cap Kierulff, 820 W. Olympic, Los Angeles 15, Calif.

SELL OR TRADE—Cinemaster II 8mm. movie camera, telephoto lens, filters, metal tripod, sun shade and leather case. Want 3-band mobile conv. or transm., or make cash offer. W. M. McDonald, Virginia Ave., Woonsocket, R. I.

FOR SALE—Rider Chanalyst $60; Precision ES500 oscilloscope $125; Williamson 807's amplifier $35; 2-speed disc recorder and playback $35; 16mm sound projector $150. A. J. Banas, 24 Edmel Rd., Schenectady 2, N. Y.

WANTED—Meter for Supreme mod. 89 tube and set tester, or will sell same, less meter. Rem Radio, 9601 St. Cyril, Detroit 13, Mich.

SELL OR SWAP—Amusement machines, suitable for recreation room, delicatessen, etc. Need xmitter, mobile rig or ? G. F. Grandt, Wellington, Ohio.

FOR SALE—Stancor 202A with coils for 10-20-40-80 m. bands $70; Hallicrafter S77A rec., A-1 cond. $65. D. Tinnerello, 238 E. 123 St., New York 35, N. Y.

WANTED—Hallicrafter mod. 38-B radio set. State cond. and lowest cash price, sub. to examination. Al Lewis, 37 Bay 26th St., Brooklyn 14, N. Y.

WANTED—BC 453 and BC 454 RF coil sets. J H. Perrett, 355 West St., Brantford, Ont.

SWAP—Tubes, parts, books, magazines. Want baseball, football guides, auto magazines, books, published before 1925. John Haynes, Doe Run, Mo.

WANTED—BC 342, 348, 312 or other good comm. rec. Will pay cash or swap table mod. TV with new pix tube, or other gear. U. W. McDaniel, 1111 Normahill Dr., Pittsburgh 1, Pa.

FOR SALE—Few TV console cabinets with full doors for 21" tube, $20 to $40; write for sizes.. 10" 630TS, good cond. $55. J. Wasiewicz, 74 Canterbury Rd., White Plains, N. Y.

FOR SALE—Electronic conv. mod. S1345 input voltage 110 DC, output voltage 110 AC, max. wattage 75, vibrator type no. 11028. Want Howard preselector mod. 650, Type-a-Tunes, music box movements. E. E. Youngkin, 602 E. Grant Ave., Altoona, Pa.

TRADE OR SELL—Short-wave conv.; power transformers, radio dial drums. Want comm. rec. or ? Fred Simonian, 16D Ellis St., Lynn, Mass.

SALE OR TRADE—B. C. 221AK freq. meter with reg. AC power supply and factory built-in mod. $65; Instr. books for BC-348, BC-375, BC-221, SCR-274N, ART-13, SCR-522, $2.50 ea. Want K35 or similar camera. R. A. Owens, P. O. box 71, Walnut Ridge, Ark.

WANTED—Auto radio custom built with grill for '49 Dodge, good cond. State price or swap radio eqpt. C. B. Kelley, 7204 Clovernook Av., Cincinnati 31, Ohio.

WANTED—Old issues QST, particularly Dec. 1915, all 1916, Jan.-Feb. 1917, Oct. 1919. T. J. Styles, Armstrong Research Lab., Philosophy Hall, Columbia U., New York 27, N. Y.

FOR SALE—Radio chassis, standard make. Want square frame small milliamp. meters 2" or 2¼" in face; 0-50 milliamp. in good cond. L. A. Goldstone, 1279 Sheridan Ave., Bronx 56, N. Y.

FOR SALE—Astatic FLC pick-up, two crystal cart's, diamond stylus Astatic FL-filter, Stancor output trans A-2313, Weston mod. 665 selective analyzer RCA tubes. J. Holloway, Cent. YMCA, Philadelphia 3, Pa.

TRADE—De Forrest Radio TV Course for Electrical Meter Engineering course. A. Lopez, 49 E. 106 St., Apt. 12, N. Y. C. 29, N. Y.

WANTED—For cash: VOM, VTVM, test eqpt., 100 kc. crystal. Send comp. description and best price. M. Weinberg, 987 E. 178th St., New York 60, N. Y.

WANTED—Motorola mod. TS 114 chassis, less pic tube, in good working cond. State price in first letter. M. Roman, 1464½ Sherwood Ave., N. Tonawanda, N. Y.

WANTED—SW3-FB7 or XA and photography eqpt. Will trade amateur radio parts or pay cash. E. E. Hoover, P. O. Box 1025, Newark, Calif.

FOR SALE—Eico mod. 950A resistance-capacitance-comparator bridge, like new. Best offer. C. D. Howard, Jr., Olive St., R. D. 7, Pittsburgh 29, Pa.

FOR SALE—Williamson amplifier, dual chassis, Acrosound TO-300 output transformer, KT66 outputs, 1 v. in 30 v. out $75. Thomas Burgan, 1160 Namdac Ave., Bayshore, L. I., N. Y.

SELL OR SWAP—Solar 120 enlarger, f3.5 lens; Voigtlander 9x12 cm f4.5 skopar, roll back adapter, filters, case, etc.; dark room eqpt., all $90, or swap for 10 m. mobile rig: 150 w. CW xmtr. Eco, first $50 takes. P. Hnatt, Box 5, Marilla, N. Y.

FOR SALE—Radio and TV sales and service business, same exc. location 6 yrs., comp. stocked, low rent, good reputation. Jones Radio and Appl. Co., 3015 Orchard Lake Rd., Keego Harbor, Mich.

FOR SALE OR TRADE—Hallicrafter SX71, used only 1 day. John F. Ehrlich, 281 Schaffer St., Brooklyn, N. Y.

SELL OR TRADE—Supreme VTVM mod. 565 like new. Want oscilloscope, Heathkit or other or $90 cash. Harry's Radio Service, 238 E. Park, Butte, Mont.

FOR SALE—Hallicrafter SX 42 rec., all-round short wave plus AM-FM, like new; fine walnut cabinet. Geo. W. Wiebe, 711 Ocean Ave., Brooklyn 26, N. Y.

FOR SALE—Hammarlund HQ129X with spkr.; orig. owner, good cond., $115. G. Ehrler, 261 Arlington Ave., Bklyn., N. Y.

FOR SALE—Sam's FOTOFACTS 38 to 70 $1 ea.; Precision tube checker no. 912, good cond. $35; Philco car radio for '41-'49 Plymouth, $20. W. J. Pettit, Jr., 1714 Austin St., Houston 3, Tex.

SELL OR TRADE—Jensen HNP51 coaxial in walnut bass reflex housing, orig. cost $125. Want Plymouth '50 radio, Craftsman RC-10 tuner or what have you? John Schneider, 5650 W. 63rd Pl., Chicago 38, Ill.

FOR SALE—RCA TV calib. WR-39B, used few times, $150, and Victor Sound-Silent projector mod. 40B comp., $150; both in perf. cond. Don Y. Yen, Rockford, Mich.

FOR SALE—Back issues of Popular Mech., Popular Science, Mech. Illustrated, Science & Mech., 30c ea. pp. No COD or checks. J. J. Cannon, 143 High St., Mauch Chunk, Pa.

TRADE—Rifles and shotguns for mobile eqpt. Surplus eqpt. not considered except PE-103A dynamotors. E. N. Berato, P. O. Box 71, Walnut Ridge, Ark.

TRADE—Comp. set of tuning units (plug-in coils), 20 units; also crystal filter unit, all in orig. cartons, for Royal Signet typewriter in exc. cond. with case. Wesley W. Brogan, 306 Bethlehem Pike, Ambler, Pa.

FOR SALE—Hickok traceomotor mod. 156 with cables, all like new. Best offer. Want TBS 50D transmitter. W. B. Sanford, 560 Walnut St., Fall River, Mass.

FOR SALE—Heath 06 scope $35; G5 sig. gen. $15; T1 sig. tracer $10; Feiler TS-3A stethoscope $25; NRI mod. 68 tube tester $25; all in exc. cond. Jack's Radio Service, Iron City, Tenn.

SELL OR SWAP—Sam's photo-folders 1-64, still in orig. folders, reasonable. Louis Vargo, 529 Railroad St., Windber, Pa.

WANTED—For Silvertone mod. 6303 chassis 126.223 autoradio: 1261135544 vibrator transf., vibrator socket compart. shield. A. de Jony, 286 Chestnut Hill Ave., Brighton, Mass.

FOR SALE—2 Sperti walkie talkies like new $30 ea. or make offer; BC 375E comp.; comp. parts for 301 Weston meters. W. C. Roehrich, Jr., 3870 Settle Rd., Mariemont 27, Ohio.

SELL OR TRADE—NRI pro. sig. gen. mod. 88; sig. tracer mod. 33; tube tester mod. 67; Simpson mod. 260 with case, all like new. C. H. Johnson, 2006 S. 19 St., Lacrosse, Wis.

FOR SALE OR TRADE—Burton mod. 111 sig. gen; Hickok 305 scope; Superior 450 tube checker; Eico sweep gen.; Silver 906 sig. gen.; Supreme 333-D VOM; Rider man. 1-6. Want high powered rifles or best offer. Ritenour Radio Service Co., 7842 Hampton Blvd., Norfolk 8, Va.

FOR SALE—HQ-120X, spkr. and xtal., exc. cond.; 250 bulk Jan 6SN7GT, like new; BC 453 like new; 3-4, 4-5.3, 7-9 mc command transmitters; all units comp. Best offers. Ray Shahan, Rt. 1, Burton, Wash.

WANTED—Hickok 209A; Weston 695 type 2; Triplett 2470 wattmeter; Hickok 610 gen.; Sylvania polymeter; battery voltohmyst. Bert C. Emery, 5729-23 Ave. So., Minneapolis, Minn.

FOR SALE—Late mod. Webcor tape rec.; BC-342-M comm. rec.; Hickok mod. 125 electronic volt-ohm-milliameter., all in good cond. Make reas. offer. Dwight Weber, 1131½ N. Los Robles Ave., Pasadena 6, Calif.

SELL OR TRADE—150 back issues of Radio-Craft magazines dating from July 1929 issue no. 1) to Dec. '45. Need audio eqpt. or make cash offer. Anthony Manfredi, 91 Barker Ave., Eatontown, N. J.

FOR SALE—No. 0 Speed Graphic camera 1-5/8" x 2-½". Rebuilt for 127 film; fixed focus, optical viewfinder, Zeiss Anast. f/6.3 lens, focal-plane shutter, in leather case. First $50. Moffat St. Clair, 703 W. Sullivan St., Olean, N. Y.

FOR SALE—Snaider Auditorium P-520 TV console, 20x26 picture, real home movie size; 5½ video I. F. stages, 4.25 mc. bandwidth, perf. cond.; list $1495, will sacrifice. N. P. Forcier, Essex St., Middleton, Mass.

WANTED—Johnson Viking transm., wired. Cash. Thomas G. Ravesi, 99 Rockridge Rd., Waltham 54, Mass.

FOR SALE—HQ 129X, like new, $139; NRI tester, mod. 1125A and mod. 1151A sig. gen. and VOM, fine cond. $20; tube tester NRI (Triplett) mod. 1185, 110 VAC $20; NRI Radio & TV course in binders $25; A. Livingstone, 12-01 Ellis Ave., Fair Lawn, N. J.

FOR SALE—Eico mod. 221K VTVM $20; mod. 425K 5" oscilloscope $40; mod. 320K sig. gen. $15; mod. 950K R-C bridge and R-C-L comparator $15; all exc. cond. R. S. Green, 6440 City Line, Phila. 31, Pa.

FOR SALE—RCP 322 tube tester with Roll-index chart and comp. chart to check modern 7 and 9 pin tubes, $45. Peter J. Thomas, 3123 S. Shields Ave., Chicago 16, Ill.

FOR SALE—Heath oscilloscope mod. 0-7, exc. cond. $40 plus shipping charges. Ray Parker, R-2 Mechanicville, N. Y.

FOR SALE—Quality disc recorder, with GI mod. R-90L cutter, as illus. and discussed in Nov. Radio & TV News. Best offer over $100 FOB. John T. Moore, P. O. Box 63, Seneca, S. C.

FOR SALE—Rider vol. 3, $5; 12, 14, $9 ea.; 13, $10; 15, $12, like new. You pay express. G. T. Mackenzie, 1948 Lewis Mt. Rd., Charlottesville, Va.

FOR SALE—0-120 amp., 2½" rd. Aero Weston with shunt; 0-150 v. AC 2½" rd. Aero Weston used twice; Burgess Vibro-sprayer $6. Ted Solarz, 3033 S. Pulaski Rd., Chicago 23, Ill.

WANTED—TG-10 Keyer and tapes if reas. price, or trade radio and TV parts. Fred W. Bearinger, Box 56, Denver, Pa.

WANTED—Weston mod. 665 selective analyser; Wetson 685 vac. tube tester; Weston 666 socket set; T33 mike. W. E. Schwenzer, 3619 Peach St., Erie, Pa.

WANTED—RCA-Rider audio chanalyst and Operadio Flexifone) mod. 420 master station 6 position. State age, cond. and price. Edw. Scribner, 311 Main St., Schoharie, N. Y.

FOR SALE—Rider man. 1-21; TV man. 1-8 and indexes. Cost over $550, will sac. for $225. Don Daus, 27 Neptune Ave., Woodmere, N. Y.

FOR SALE—Hallicrafter SX-28 comm. rec., with new Jensen ext. range spkr. in hvy. bass-ref. cabinet, fact. finished, realigned, $180. Might sell without spkr. Paul C. Crum, 751 N. Central Ave., Chicago 44, Ill.

TRADE—Wheatstone bridge, NRI xmtr., kits, manuals. Want good port. typewriter, astronomical telescope or TV booster, or what have you? George Wetzel, 5 Playfield St., Dundalk 22, Md.

SALE OR TRADE—Two Eico sig. gen. no. 315, fact. built, used very little, $69 list; Eico no. 221 VTVM in very good cond. Want Hickok no. 209A VTVM, cash or trade. Leonard Cammarata, 2225 W. 5 St., Brooklyn, N. Y.

FOR SALE—Panoramic adaptor, mod. SA-3, T-200, same as BC-1031A or Navy RBV; 115 v., 60 cycle, 100 kc. sweep, A-1 cond. with all tubes. Best offer. B. C. Grant, 16 Saco St., Dorchester 22, Mass.

FOR SALE—ATA aircraft transmitter, all tubes and xtal, 2.1-3 mc., good cond., and UTC S-20 55 w. mod. xformer. Both for best offer over $20. Jerry A. Pope, 409 N. Magnolia Ave., Dunn, N. C.

WANTED—Back issue magazines and periodicals. Send list and prices. Also want good copy "The Oscillator at Work" by Rider. Alan G. Sorensen, 3144 Laurel St., Napa, Calif.

FOR SALE—All TV folders from Sam's Photofact from first issue through folder 177, brand new, $50. H. L. Wilson, McRae, Ga

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FOR SALE—AM-FM dynamic demonstrator, RCA type WE-82A, $60; mod. 710 coastwise (Ferret) audio oscillator $60, both in exc. cond. Crescent City Trade School, 2445 St. Bernard Ave., New Orleans 19, La.

WANTED—TV-radio-phono technician with car, part time. Preferably man over 40 who has been doing own work Paragon Radio Service, 170-26 Jamaica Ave., Jamaica 3, L. I., N. Y.

FOR SALE—CD Capacitor analyzer mod. no. BF 50, exc. cond. $34. Wilbur L. Newcomb, Eagle Rock, Va.

WANTED—Surplus electronic eqpt., BC348, BC221, BC453B, R89-ARN5A, I-152C and others. Send list, cond. and price. Will pay cash or trade. B. Sroka, 5341 Cordelia Ave., Baltimore 15, Md.

WANTED—Feiler TS-3A sig. tracer, mutual conductance tube tester, VTVM. Have S-38 Hallicrafter, cash for test eqpt. F. E. Prestel, 3747 N. Olcott, Chicago, Ill.

FOR SALE—AM-FM sig. gen., McMurdo-Silver mod. 906 used very little. List $116, will sell for $55. Ray Wozniak, 126 Abington Rd., Rochester 9. N. Y.

FOR SALE—TV heavy duty 300 ma. power transformer with diagram, handles any TV set or audio amplifier, $5. Al Rosen, 1319 N. 76 St., Philadelphia 31, Pa.

FOR SALE—Dumont oscilloscope types 241 and 247, best offer over $220; Hewlett-Packard audio oscillator mod. 200B, $70. S. S. Brody, 1814 E. 16 St., Bklyn., N. Y.

SELL OR TRADE—NRI tube tester, mod. 68, like new; 2 sets of test data and tech. man. inc. $27 cash, or what have you? Wayne Meyerhoff, Rt. 2, Box 117, Fairbank, Iowa.

WANTED—1250-1500 v. 500 mill plate transformer, WE 1126C amplifier, B&W distortion analyzer, cueing pads and vu meter multiplier pad. Sell or trade Webster wire recorder, 1000 feet RG-78/U co-ax and radiotone RA-16 2-speed 16" disc recorder. Roland Jordan, Jr., Sta. WSBB, New Smyrna Beach, Fla.

WANTED—Schematic diagram of National rec. 101 X. Will pay up to $5. Eagen Smith, 2020 Fourth St., Madison, Ill.

FOR SALE—Superiorr sig. tracer, in very good cond. $35. R. J. Conradi, 6141 Harrison Pike, Cincinnati 11, Ohio.

SELL OR SWAP—Heath 0-7 scope 5" with crystal probe. Want port. wire or tape recorder. Brendan J. Klein, 3951 Guilford, Detroit 24, Mich.

FOR SALE OR TRADE—Triplett load-Chek mod. 660, used very little. Need scope and condenser checker. Norman Nelson, Madison, Minn., c-o Ronglien's TV Service.

SELL OR TRADE—Rider man. 1-5 abridged 7-10, 12, 13, 15, like new, for 16mm camera, AC 750-1000 w. power plant or ? Denny Peterson, First Ave. North, Great Falls, Mont.

WANTED—Old Majestic rec., mod. 90-B pref., in good working cond., reasonable. Will consider other mod. with schematic. William Hintz, Rt. 4, Hutchinson, Minn.

WANTED—Solar exameter; need not be in working cond. if price reas. S. Pentland, Canajoharie, N. Y.

WANTED—Comm. Course and lab. material, similar to NRI or CIR; also high power rig, 500 w. Sol Herman, 135-30 232 St., Rosedale, N. Y.

WANTED—By Laurelton Radio Club, 2 meter rig, at least 100 w.; 250 w. or better all-band rig. "Bob," Apt. 3B, 135-30 232 St., Laurelton, L. I., N. Y.

WANTED—Solar capacitor analyzer mod. CE, type 1.60, good cond. Roy's Radio Service, 963 Allen, Ferndale 20, Mich.

WANTED—Eico VTVM in perf. cond. at a reas. price. Quote price. Samuel E. Dutton, 233 E. 66th St., Los Angeles 3, Calif.

FOR SALE—CW transmitter, suitable novice with crystal in novice band $25; BC-454 converted to 40 and 80 m. reception, AC power supply $20. Herbert Greenberg, 821 Rutgers Rd., Franklin Sq., N.Y.

FOR SALE—HQ-129-X Hammarlund comm. rec., exc. cond. with matching spkr $125. J. R. Driver, 6419, Fitzhugh Ave., Richmond, Va.

WANTED—Vol. 2 and 3 of the RCA TV Pict-O-Guide. Wilbur L. Brown, 2035 Market St., Oakland 12, Calif.

WANTED—RCA TV testing eqpt. calibrator, sweep gen., oscilloscope, VOM, Rider TV manuals. U. Kozma, 1665 Stadium Ave., N. Y. 6, N. Y.

FOR SALE—Sam's Photo Facts 1-80 in 8 bound vol., exc. cond., $75 FOB. Donald E. Schafer, 340 S. Virginia Ave., Burbank, Calif.

WANTED—Books on radio. State cond. and latest copyright date. Vincent H. Grey, Rt. 3, Box 381, Holly Hill, Fla.

TRADE—Enfield 30-06 rifle, sporter stock, Weaver 330 scope on Redfield mount; for Hallicrafter S40B or equal, or test eqpt. or welding eqpt. W. D. Barry, 7529 Kalamazoo, Citrus Heights, Calif.

SWAP—'40 Dodge half ton panel and Midwest chassis 18 tube, 12" spkr, for radio, TV test eqpt. D. A. Vesey, 19224 Woodside, Detroit 24, Mich.

SALE OR SWAP—Air Conditioning Training Corp. home study course, Youngstown, Ohio; never used, cost $250. Want radio and TV test eqpt. Carl A. Raimo, 94 Berkeley Blvd., Iselin, N. J.

FOR SALE—Sam's Photofacts 1-120 in binders, like new $150; auto. phono, 78 rpm $10. Charles H. White, Mountain Hts. Ave., Lincoln Park, N. J.

FOR SALE—Knight PA system mod. 30M, 6 and 110 v. AC or DC with turntable; 2 12" spkrs with cord; Electro-Voice dynamic mike, mod. 640. Will sell for $85. Rev. M. J. Malone, 728 State St., Osage, Iowa.

WANTED—Antenna coil for Emerson mod. AX 240. Arthur Krause, Box 66, Quarryville, Saugerties, N. Y.

TRADE—Jackson mod. 523 3" scope. Want tape rec., NC 57 comm. rec., NC 125 comm. rec., S 53A comm. rec., or ? Howard Haftel, 1651 Montgomery Ave., Bronx 53, N. Y.

FOR SALE—Astatic TV booster mod. AT-1, perf. shape $22 prepaid. M. S. Barnhardt, 103 Venus Rd., Oak Ridge, Tenn.

SELL OR TRADE — Enclosed rack 51" x 19" panel space. Doors each side; top, back, and sides perforated for ventilation; $20 or trade for prop pitch motor and BC-453. Local preferred. J. Coretti, 552 E. 240th St., Bronx 70, N. Y.

WANTED — NRI Sig Tracer in good condition, either model 33 or 34. State price. Roy O. DeVoe, 105 S. Union St., Dodgeville, Wis.

FOR SALE—1 Hickok Scope mod. D-195A, $85; 1 Hickok TV Gen. mod. D-610, $85; Rider Manuals 5 to 18, $80. Sold separate or best offer takes all. All in good condition. Harold Hoffman, 319 Seward St., Pontiac 20, Mich.

SALE OR TRADE — Supreme tube tester model 503 needs little repairs. Want small AM-FM receiver. Geo. G. Moll, 1118 Music St., New Orleans, La.

FOR SALE — Hallicrafters SX-28-A $125. Clifford Anderson, 15 Midwood Ave., Allendale, N. J.

SALE OR TRADE—Eimac 304TL tube for ham receiver. Fred R. Allen, 719 Cleveland Ave., Michigan City, Ind.

FOR SALE—Sam's Photofacts, 1 to 13, $8; also Simpson 260 volt-ohm-ammeter, $22. Hyman Levine, 243 Heyward St., Brooklyn 6, N. Y.

SWAP—Tube tester model 1240 Superior, good condition. Want vibrator tester or power supply. Regulated. Oswald Maillet, 5 Emerald St., Gardner, Mass.

FOR SALE—10,000v 23ma Xformer, $7; meters, 1 madc, ½ madc, 10 vac, all $8; mikes, Turner BX $4, CX $7, Amperite FSH hi-fi velocity, $15; 2AP1A CRT $5. B. Weisberg, 2707 Creston Ave., Bronx 68, N. Y.

FOR SALE—Rider Manuals 1, 2, 3, $12; Electro Voice V2 mike with cable, new condition, $15. United Radio, Okawville, Ill.

SALE OR TRADE—RU 19 receiver and GF 12 transmitter with all tubes, plugs, schematic, and coils 200 kc thru 14 mc, $35 FOB Philadelphia, or good FM tuner. Arthur D. Fisher, 600 W. Roosevelt Blvd., Philadelphia 40, Pa.

WANTED—RCA or Hickok TV Sweep Gen. Good scope reasonably priced. Precision E 200 Sweep Gen. Marvin Rudow, 2700 Kingsbridge Terrace, Bronx 63, N. Y.

FOR SALE—Tube and multi-tester Supreme model 333 in good condition. Gerson Cohen, 3121 Brighton 5th St., Brooklyn 35, N. Y.

FOR SALE—BC 348R communications rec. $100. Two BC 645A Transceivers $30. Model 80-1 Webster wire recorder $80. All in excellent condition. John Halchak, 92 Lee Park Ave., Wilkes-Barre, Pa.

FOR SALE—Signal Corps receiver R-44/ARR-5. Tunes 27-143 Mc. AM or FM $95. George Metelsky, RFD 2, Willimantic, Conn.

WANTED — 7" television set, Hallicrafter preferred, others considered. Also radio servicing equipment and supplies. Will trade Superior model 200 signal generator, AM-FM radio, 17 jewel pocket watch, etc. Bruno DeCola, 379 South Broadway, Salem, Ohio.

WANTED—Technical manual for type CKB 20104A rectifier power unit and for LM-7 frequency meter. W. E. Schwenzer, 3619 Peach, Erie, Pa.

SALE OR SWAP—Receivers BC 454 and 455, both converted, with power supply for one receiver. Raymond Fisher, 627 Fallowfield Ave., Charleroi, Pa.

FOR SALE—Homemade 12 w. xmtr $5. M. Konon, 244 Irving Ave., Bklyn. 37, N. Y.

SALE OR TRADE—Amertran 1500-1250-0-1250-1500 transf. @ 1 amp. with 10 HY 1 amp. choke. Cash or Riders, Sams TV, or test eqpt. FOB. W. J. McCormish, 14 Forest Side Ave., San Francisco 27, Calif.

SALE OR TRADE—PE-103 comp., extra dynam., pr. Selsyns 110 v. AC 60 c., nr 2J1G1. Want BC 683 rec. L. P. Lastuvka, 1044 19th St. SE, Cedar Rapids, Ia.

WANTED—GE RTP-030 TV power transf. for model 802 TV comb. Richard Hillman, 610 York St., Michigan City, Ind.

WANTED—Mod. L Atwater-Kent spkr in good working cond. Ross Electric Motor Shop, Fairmont, Minn.

WANTED—Best commercial rec. that $75 will buy. Must be unaltered and cover 160-10 meters. No surplus! K. D. Anderson, Kerkhoven, Minn.

FOR SALE—Heathkit 03 oscilloscope, perf. cond., comp. with instr. man. Best offer over $25. FOB Leavenworth, Ind., Merrilees Radio Service, Leavenworth, Ind.

SALE OR TRADE—7hy. choke, conservatively rated at 1.6 amps. Hermetically sealed and designed to military stand. Tested at 2800 VDC, never used; $15 or other eqpt. R. H. Gauger, 26-29 212th St., Bayside, N. Y.

FOR SALE—Ampro tape recorder, comp., unused; must sac. $95. D. Bollettino, 142 W. 46 St., New York 36, N. Y.

TRADE—Kodak 35mm camera, 16mm projector, auto. rec. changer, like new, with built-in amp., Trela wireless auto. rec. changer, like new. Want 6 v. battery eliminator, VTVM, sweep gen. or test eqpt. Armen Markarian, 184 Corliss Ave., Johnson City, N. Y.

SELL OR TRADE—GE photo electric system, like new, for industrial or home use, comp., ready to operate. Want rifle, pistol, shotgun, or small TV. Toni Slapkowski, Box 439, Sicklerville, N. J.

FOR SALE—5 0-1 M.A. meters, 4" sq. type bakelite case, with VOM scale in orig. boxes, ea. $6 postpaid. L. Weinreb, 151-09 34th Ave., Flushing, N. Y.

WANTED—Measurements Corp. stand. sig. gen. mod. 80. Quote price, age, cond. Wm. W. Fitzgerald, 211 South St., Minden, La.

FOR SALE—Early Hallicrafters S meter, lighted scale 0 to about 40 DB, for S20R or similar rec., plugs into radio. Cost $16, best offer over $8 takes it. Stanley Strangle, Trout Creek, Box 6, Mich.

WANTED—Mod. 7H822 chassis 7EO2 and mod. 6G801 chassis 6E40 Zenith radio sets. C. R. McConnell, 74 Winding Way, West Orange, N. J.

SALE OR TRADE—Keystone R8 projector and large supply of Hollywood Art films worth over $136. Sell for $100 or trade for Dorsey records. V. L. Madden, 412 Columbus Ave., Tuckahoe 7. N. Y.

FOR SALE—Eico VTVM mod. 221, factory calib., $25; Eico mod. 400 push-pull, fact. inst., $35; Tele-King mod. 210 10" TV, new tubes, sound, no HV, $35. Jack Bechtler, 23-79 206th St., Bayside 60, N.Y.

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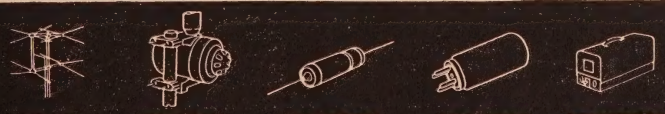

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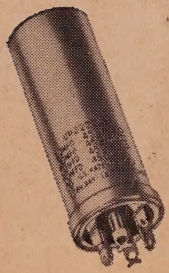

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